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Positioning apparatus for multiple-spindle machining.

Positioning apparatus for multiple-spindle machining, comprising : (a) a plurality of up-standing columns (B) rigidly interconnected to a common platform and aligned parallel to each other and perpendicular to the platform within an accuracy of $\pm 0.00125\text{cm}$ ($\pm .0005$ inches) ; (b) rail means (C_1-C_4) extending between each of the columns along the periphery defined by the footprint of the columns for providing movable support and having bearing means on the columns providing for movement of each rail means along the Y-axis ; (c) other movement means (D,E) slidable on each of the rail means (C_1-C_4) along at least another axis of movement ; (d) linear motor means (M) for selectively moving the rail means (C_1-C_4) and other movement means (D,E) along said respective Y and another axis at peak accelerations or decelerations of about 1-2 G's ; and (e) spindle means (F) on each ram having a spindle rotationally driven about an S-axis thereof.



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EUROPEAN SEARCH REPORT

Application Number
EP 93 30 5664

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------|----------------------------------------------|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.5) |
| A | WO-A-89 11375 (SOMEX S.A.) * abstract; figure 3 * --- | 1 | B23Q1/14 B23Q5/28 |
| A | GB-A-2 194 907 (W.R. VAUGHAN) * abstract; figure 1 * --- | 1 | |
| A | EP-A-0 294 869 (SZ S.R.L.) * abstract; figures 1,2,4 * --- | 1 | |
| A | DE-A-16 52 751 (WERKZEUGMASCHINENFABRIK WALDRICH COBURG) --- | | |
| A | US-A-5 091 861 (Y. GELLER) --- | | |
| A | GB-A-1 043 240 (JONES & SHIPMAN) --- | | |
| A | EP-A-0 172 299 (MASCHINENFABRIK DIEDESHEIM) --- | | |
| A | EP-A-0 379 877 (DIXI) ----- | | |
| | | | TECHNICAL FIELDS SEARCHED (Int.Cl.5) |
| | | | B23Q |
| The present search report has been drawn up for all claims | | | |
| Place of search BERLIN | | Date of completion of the search 8 May 1995 | Examiner Korth, C-F |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>..... & : member of the same patent family, corresponding document</p> | | | |

EPO FORM 150 (01.92) (P4/C01)



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

☒ LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-19: Special design of an apparatus with linear motors.
2. Claims 20-24: Method of machining multiple sides of a workpiece by use of linear motors.

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims: 1-19



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2. Claims 20-24: Method of machining multiple sides of a workpiece by use of linear motors.